Colony of Seychelles.

ANNUAL REPORT

ON

AGRICULTURE AND CROWN LANDS

FOR THE

YEAR 1913.

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1914.

AGRICULTURE

AND

CROWN LANDS

ANNUAL REPORT

1913.

I.

Expenditure, Receipts, Sale of plants.

			Rs	c.
Sale of produce	...	...	1,606	42
Sale of Crown Lands	...	...	16,572	25
Royalty on Guano	...	...	52,880	65
Export duty on Guano	..	...	34,720	00
		Total Rs	105,779	32

Total Expenditure under Agriculture and Crown Lands ... Rs... **15,187 24**

The principal plants sold were the following :—

Palm Oil (*Eleis Guineensis*)
Various lemon grasses (*Cymbopogon*)
Ceylon plantains (*Musa paradisiaca*)
Cedar (*Casuarina equisetifolia*)
Coffea robusta and sub-varieties
Cola nitida rubra
Mauritius mangoes
Eddoes and Tannias (*Xanthosoma Sagittifolium*)
60 varieties of ornamental plants
All spice (*Pimento officinalis*)

II.

Condition of the garden, striking species introduced flowered and fruited.

Among the plants which flowered and fruited for the first time may be mentioned :—

Thornless limes (introduced from Dominica)
Canarium commune
Durio Zibethinus
Odontadenia Harrissii
Kleinhovia hospita
Tecoma jasminoides
Congea tomentosa
Tristellatia australis
Amaryllis Mrs Garfield
Jacobinia coccinea
Passiflora coccinea
Crinum sp. (variegated leaves)
Couroupita Guineensis (Cannon ball tree)
Phyllanthus atropurpureus
Solanum seaforthianum
Aristolochia Duchartrei
Eichornia crassipes

The Durian and the Java almond trees (Canarium commune) flowered abundantly but the fruits did not set except one Durian which grew as big as a child's head but fell before maturity. This Durian tree was obtained in 1903 in Java from trees which were pointed out to me as possessing fruits of particularly good flavour and nearly scentless. In view of the difficulty of obtaining fresh seeds of this fruit tree, the first fruiting of the introduced trees has been watched with some anxiety.

Among creepers the following have been much admired by visitors:—

Odontadenia Harrissii
Tecoma jasminoides
Congea tomemtosa
Tristellatia autralis
Passiflora coccinea

all of which produce flowers of uncommon colour and beauty.

Among the newly introduced plants, the following are specially mentioned:—

Soft shelled palms from German West Africa
Kola nuts from Sierra Leone
Shea butter nuts (Pentadesma oleracea from Nigeria)
Terminalia edulis from Philippines
Nipa fructicans from Philippines
Antidesma burnius ,,
Jaboticaba ,,
Cambrica ,,
Andropogon or C, flexuosus from Ceylon
,, Nardus Maha Pengiri ,,
Brazil nut (Bertholettia excelsa from Trinidad
Tonka Beans (Dipterix odorata) ,,
Malpighia sp. from Barbados
Gros Michel banana from Fiji
Coffea robusta from Java
,, Quilloer
,, Canephora
,, Laurentii
,, Uganda
Kokia rockii from Washington
Strychnos nux vomica from Madras
Hymenaea verrucosa (Gum copal) from Madagascar
Berassus Madagascariensis ,,
Beaucarnea recurvata from Mexico.

Over 100 tins of seeds were received from Mauritius, India, Ceylon, Singapore, Madagascar, Java, Philippines, United States, Trinidad, Mexico, and 80 tins were sent in exchange, besides 3 boxes of vanilla vine.

The oil palm introduced from Mauritius in 1902 was identified at Kew from fruits shipped to the Imperial Institute in July 1913 as being a form of Eloeis Guineensis Jacq. The results of the examination of the fruits at the Imperial Institute showed that the pericarp of the fruit yielded about 33 o/o of oil equivalent to about 19 o/o from the whole fruit. The percentage of kernel per cent of fruit amounted to 28·4 o/o. It is fortunate that this tree belongs to a good type of oil palm as already several plants of the second generation (within 12 years) are fruiting at Victoria and at Mamelles and that no time for propagation will thus be lost.

Seeds of other palm oil trees were however introduced from Lagos in 1911 and in December of this year (1913) about ½ cwt of seeds of the thinner shelled kind of palm fruit was imported from German West Africa through the instrumentality of His Excellency the Governor of Southern Nigeria.

The two kinds of palm fruits (thick and thin shelled varieties) should be grown side by side in this Colony as the thin shelled varieties are very often destitute of kernels which are also articles of export and greatly needed in this Colony for the feeding of pigs and poultry and for the preparation of a fine edible oil.

Coprah exportation has deprived planters of the residual cake (poonac) formerly obtained from coconut oil factories which are nearly all closed and it is hoped that palm kernels although very hard to break by hand will at some future date serve as substitute for poonac which is now sold at a price exceeding 8 cents a ℔. The rearing of pigs and poultry is becoming a difficult problem the whole community having formerly relied for the feeding of them on a by-product more or less unsaleable (poonac). Unless another similar by-product is available, such as palm kernels it will take much time to induce the inhabitants to grow Indian corn and other grains for the exclusive purpose of feeding their domestic animals. For this and for other purposes such as the production of cheap oil to be used in the soap factories, which are also heavily handicapped by the closing down of coconut oil mills, there is no plant more useful than the palm oil to cultivate as an auxiliary crop in Seychelles and this consideration has led us to publish a report dealing with the methods of planting oil palms and of preparing palm oil and palm kernels. This report has been published in the local paper *Le Réveil.*

In December of this year the largest tree growing at the Botanic Station (the one originally introduced from Mauritius) produced an abnormal bunch of fruits which instead of weighing 8 to 10 ℔s as the others, reached the phenomenal weight of 40 ℔s. The fruits in countless numbers were however not so large as in smaller bunches. This together with the fruiting of other trees within five years (the first male flowers appear in the third year) tends to show that the soil and climate of this Colony are very suitable to this useful species of palm which will not be out of place in this small Colony where indigenous palm trees already occupy such a prominent place in the jungle.

III

Distribution of information on Agricultural matters.

The following reports have been published this year (1913).

1o. Report on the methods of growing Palm oil trees and of preparing palm oil and palm kernels.

2o. Report on the importance of growing plants producing oil seeds with special reference to the Kapok tree (Eriodendron anfractuosum) and the wood oil tree (Aleurites triloba) already established in the Colony outside the coconut growing zone.

3o. Report on the necessity of improving coconut cultivation by manuring and by selecting seed nuts.

4o. Report on the attack of barnacle scale insects (Aspidiotus ficus) on coconut trees and on suggested methods of destruction.

5o. Report on the propagation of the small black ants (Technomyrmex albipes) and on the methods of combating it.

Further reports were made :

1o. On the results of a visit of inspection to the Crown lands and to several estates of Praslin submitted to His Excellency the Governor.

2o. Report on the rubber industry (newly started) supplied to an Exhibition Committee in London.

3o. Report on vanilla planting supplied to the Government of St Helena.

4o. Report on the preparation of banana flour, dried bananas and Jamaica figs, supplied to the Governor of Fiji.

5o. Report on the best methods of working Félicité Island without prejudice to the interests of Government.

Photographs of the coconut beetle (Melitomma insulare) in its various stages of growth were made on specimens supplied to the Director Jardin Colonial France and 100 prints distributed to planters.

IV

Meteorological Observations.

The total rainfall for 1913 is 21 inches lower than the total for 1912 which was the wettiest year on record for the last 9 years. In comparing the following records for last three years from June to June in order to show the influence of rainfall on the crops which are governed by the rains occurring from November to April and not from January to January, one can see little difference between the rainfall for 1910–11 and that for 1912–13 but the monthly distribution is far from being equal during the two periods in question. Everybody still recall the drought of 1910–11, while one can say that 1912–13 was not a dry year although the two total rainfalls were about the same. In 1910–11, 73 o/o of the total rainfall occurred in the four wettiest months of the year (Nov. Dec. Jan. Feb.) while in 1912–13 only 41 o/o of the total fell during the same months. In 1911–12 the rainfall during the four wet months amounted to 65 o/o of the total. This is a striking example of the influence of the monthly distribution of rainfall on vegetation. In spite of a shortage of about 17 inches in 1912–13 from the average no prejudicial influence on vegetation has been felt and one can deduce that it is quite as good to record a rainfall of 84 inches as in (1913) than one of 106 inches as in 1912 provided not more than 45 o/o of the total rainfall in the former case is registered during the ordinary wet months of the year.

Meteorological Observations.

Temperature			Hygrometer			Rainfall		Rainfall from June to June.			
Daily average per mensem	Maximum	Minimum	Wet Bulb	Dry Bulb	Humidity	Total monthly	No. of rainy dys	Months	1911–12	1912–13	1913–14
January	88.9	74.2	73.5	77.8	81	3.89	4	June	1.94	7.13	8.24
February	95.0	72.9	72.9	84.1	57	8.11	12	July	1.01	4.53	7.72
March	93.2	72.3	77.4	82.6	79	9.43	7	August	0.81	0.76	3.80
April	94.2	71.7	77.2	81.9	80	8.12	7	September	7.00	5.08	0.71
May	92.4	70.9	76.4	80.7	82	2.77	16	October	7.00	4.37	2.10
June	90.3	75.6	75.4	79.2	84	8.24	6	November	14.15	4.28	9.79
July	93.7	72.9	76.2	80.3	83	7.72	13	December	5.94	13.51	20.26
August	92.2	72.1	76.5	81.5	79	3.80	6	January	29.69	3.89	18.77
September	91.7	72.2	75.1	80.1	78	0.71	3	February	18.70	8.11	6.61
October	93.5	73.1	74.2	81.7	69	2.10	3	March	3.19	9.43	
November	88.9	72.9	73.8	81.2	69	9.79	9	April	5.56	8.12	
December	85.6	77.3	72.5	88.9	43	20.26	15	May	9.18	2.77	
	91.4	73.4	75.0	81.6	73	84.94	101		104.17	71.98	

V.

The Coconut Industries.

THE FOLLOWING NUMBER OF NUTS WERE GATHERED IN 1913 AS COMPARED WITH THE CROPS FOR 1906—1912.

	1906	1907	1908	1909	1910	1911	1912	1913
Nuts exported in nature ...	381,954	601,560	479,849	91,907	129,154	445,795	182,227	103,350
„ converted into oil ...	7,762,080	1,786,160	4,285,578	2,016,040	394,960	209,448	698,400	534,325
„ „ „ coprah ...	5,685,860	13,655,683	11,463,438	16,208,891	18,597,045	18,131,015	19,153,393	20,946,485
„ „ „ soap ...	1,243,571	1,672,006	2,969,246	1,846,040	969,542	408,969	839,104	452,046
„ consumed locally ..	4,000,000	4,000,000	4,000,000	4,000,000	4,000,000	4,000,000	4,000,000	4,000,000
TOTALS ...	19,073,465	21,715,049	23,198,111	24,162,878	24,090,701	23,195,227	24,873,124	26,036,206

The crop under record is the highest ever produced in the Colony; it exceeds that of last year by 1,163,082 nuts and that of 1911 by nearly 3 million nuts. The figures for local consumption were still estimated at 4 million nuts but as the population is steadily increasing these figures are probably much below the mark. Nearly 21 million nuts were converted into coprah and exported thus to Marseilles. I cannot refrain as last year from mentioning that such a large exportation of coprah although considerably benefiting the Colony reacts cruelly on the poorer inhabitants who were prior to 1906 getting at next to nothing a by-product in the shape of the residual cake (poonac) of coconut mills which was used as food for cattle, pigs and poultry. The peasantry are now deprived of this by-product which is more and more appreciated on the European market and has to depend more exclusively on fish instead of using pork and chicken as formerly. There is however no apparent disturbance in the healthy conditions of the Colony as a result of the change of diet. The only rational way to get out of this difficulty is to raise a crop of oil palm nuts in the districts unsuitable for coconut growing. The culture of this oil plant is not only considered useful as providing a residual food for domestic animals but also as supplying an excellent oil for the manufacture of soap which as a consequence of the closing down of nearly all coconut oil factories is also handicapped by the want of another raw material as good or as cheap.

The high crop for 1913 is considerably less than I expected but I am afraid the shortage of rain and the ravages of the melitomma beetle went far to counteract the greater amount of care and trouble which are bestowed on coconut plantations. The crop can be doubled in a few years to come and if the question of manuring is taken up on all estates which are more or less worn out by over a century of continuous exhaustion, I strongly believe that the crop can be increased fivefold. I know a great number of estates where the crop can be increased tenfold by manuring and proper methods of cultivation. The acreage under coconut cannot be definitely established from want of a cadastral survey of the Colony but although it has not been increased considerably during the last seven years, one can say that the vacancies have been carefully supplied nearly everywhere and that the other trees which were formerly allowed to grow in most plantations are rigorously cut down to the great benefit of the palms. Given favourable weather conditions, one can foresee a material increase of the crop within the next five years owing to the greater number of trees grown in the existing plantations. There are probably over 12,000 acres of so called coconut plantations in the Colony and such a large acreage under modern methods of cultivation should yield 30 to 40 million nuts.

Owing to the rocky nature of the soil and subsoil some difficulty is experienced in rendering the soil friable by the ordinary method of ploughing but it is to be hoped that explosives will soon be imported in order to obtain the full effect of manuring. Soils apparently devoid of rocks are often unsuitable for coconuts owing to the nature of the subsoil which bakes into a hard pan a few inches from the surface and which the large roots of coconut cannot penetrate. The utility of explosives in such hard soils needs no demonstration. In coral islands the hard pan is also formed by the well known conglomerates of sandstones which render unsuitable for coconut cultivation a large percentage of the sandy plateaux of the Colony.

The time is ripe for adopting those improved agricultural methods, the high price realized by the crops sold locally at the rate of Rs 50 and even Rs 60 per thousand nuts, permitting a saving which may not remain so high for very long.

The planters should devote all their energies to manuring, ploughing or using explosives, and selecting seed nuts for planting and lose no time in keeping abreast of the times. The future of this Colony depends on those progressive methods being adopted.

When coconut oil was not used as an edible oil on the European markets, very little notice was taken of it but at present it s sold at the extraordinary price of £60 a ton. In an article devoted to the conversion of liquid oils into fats Professor Dunstan in Bulletin of Imperial Institute for November—December 1913 calls the attention of planters to the possibility, of raising the melting point of liquid oils and of transforming them into solid fats such as coconut oil (at the temperature prevailing in European countries). It appears that the process has emerged from the experimental stage and is adopted in Europe and America where cheap oil such as fish oil (very liquid) is converted into margarine (hardened oil). The reaction is very simple, the liquid oil being treated with hydrogen gas (produce electrolytically) which transforms oleic acid (liquid) into stearic acid (solid).

The produce of cheap fat is bound to come as the hydrogenation of the fish oils or other vegetable cheap oil results in the removal of the unpleasant odour and in the transformation of yellow liquids into snow white fats. It is already stated by Professor Dunstan that artificial edible fat can be produced at £26 a ton, that is to say £24 cheaper than coconut oil. It can be deduced from these facts that the demand for coconut oil is likely to fall in the near future.

It is imperative that the cost of production of coconuts should be lowered in this Colony at a time when such prices as Rs 60 a thousand nuts are paid, and a handsome margin of profit realized. Manuring and selection of seed nuts may not be easily carried out in times of depression. Manures can at present be obtained very cheaply from local guano, seaweeds and leguminous plants. There is no reason for not using them. Selection of seed nuts is also very easy. There are many varieties of coconuts growing in the Colony which are almost perfect. One of them is called grape coconut owing to the number of nuts born by each cluster (20—30). But there are very few trees of this type all over the archipelago the rest being trees producing only two or three nuts per bunch. It should however be borne in mind that logically trees producing a large number of nuts are more exacting in their requirements as to quality of soil and that the best variety of coconut would detoriate in soils rendered sterile by improper methods of cultivation. The remarkable periodicity in the number of nuts or more properly speaking female flowers per tree per mensem should be carefully studied in the selection of seed nuts in order to solve the vexed question of how the crop in India, Ceylon, Seychelles &c., is far heavier from June to November than from December to May without putting the responsibility upon climatic factors which are not the same in the three localities mentioned. From a tabulated return in my possession covering 1911, 1912, 1913, a maximum is reached in July and a minimum in February. The question of variety of trees in cultivation has almost surely much to do with this subject. The point is important as from information gathered during the last 6 years, a few tabulated returns show that the net profit per 1000 nuts is extremely variable on estates worked by the same proprietor and possessing the same kind of soil. The working expenses remaining about the same the net profit varies from Rs 40 to Rs 12 per 1000 nuts and I am told that the highest figure is given for the estate on which the selection of seed nuts has been practised for a long time.

VI.

The Vanilla Industry.

The crop of vanilla for 1913 was even lower than that for last year and the lowest on record since 1895. It amounted to a little over 5 tons (11,264 lbs) of a declared value of Rs. 85,697 or Rs. 17, per kilog. The prices are good after having been as low as Rs. 7, per kilog a few years ago and these high prices have induced planters to resume vanilla culture which had nearly been abandoned during the years of draught which prevailled from 1901—1911.

Under the influence of a good rainfall from November 1911 until now (March 1914) vanilla vines are showing very good growth especially in those localities where manuring with alternate layers of lime and earth following heavy mulching with dry weeds is adopted.

Many complaints were made in times of drought about insects attacking vanilla vines, roots or pods or causing the death of the plants. At present no such complaints are heard and vines of excellent growth are seen everywhere flowering and fruiting abundantly in spite of the myriads of ants which crawl upon the vines at the time of flowering in search of natural juice excretions where a few scale insects happen to congregate. These are sheltered by the ants from their natural enemies by structures very often made of the "sooty mould" found in the neigbourhood on the vanilla props attacked by scale bugs. It was long thought that the ants were causing the destruction of vanilla flower buds and planters now realize that the ants are not injurious having seen vines infested with ants flowering luxuriantly under the influence of good weather conditions and producing in some cases as many as 17 bunches of pods on the same vine.

The vanilla vines planted in many localities since 1911 (November) have not yet come into bearing. The weather during the year under review (1913) having been propitious better crops are anticipated in the near future. However vanilla which was introduced into Seychelles about 50 years ago has been planted all over the Colony and the vines no longer grow as well as formerly on soils which were devoted to the same plant for such a long time. The question of manuring has been taken up by a few prominent planters with marked success and a new and complete set of experiments is being arranged at the Botanic Station in order to help planters in the selection of the cheapest and most efficient manures.

As an example the following plots are being set out:

1o. No manure plot.
2o. Pen manure plot.
3o. Nitrogen with Potash and Phosphate.
4o. No Nitrogen do. do.
5o. Nitrogen with Potash only.
6o. Nitrogen without Potash and Phosphate.
7o. Phosphate with Nitrogen and Potash.
8o. No Phosphate do. do.
9o. Potash in the form of Sulphate with Nitrogen and Phosphate.
10o. Potash in the form of Chloride.
11o. No Potash.
12o. Leaf mould with Nitrogen Potash & Phosphate.
13o. No leaf mould.
14o. Leguminous grass with complete manure.
15o. Fern Grass do. do. do.
16o. Sea weed
17o. Lime with complete manure.
18o. No lime.
19o. Manure applied indirectly following a crop of cassava manured heavily.
20o. Burnt earth.

It is also contemplated to carry out a set of field trials on 1/29th acre plot on an estate near Government House newly required in order to determine the best shed trees for vanilla, the best props for growing the vines, the best time for pruning, the best phsical and bacteriological conditions of the soil and the best method of irrigation and of selecting vines to be used as cuttings.

VII.

Essential Oils and other Minor Industries.

Cinnamon bark is still being exported instead of being distilled locally. The quantity exported amounted to 765 tons valued at Rs 61,560. The steam distillation process having been adopted in the four (4) Essential Oil distilleries of the Colony it is difficult to obtain locally the cinnamon bark essential oil which is worth as much as Rs 30 per kilog. This oil requires a high temperature for distillation and to obtain it it is necessary to macerate the bark in salt water and to distil it afterwards in the same solution in order to raise the boiling point pending distillation. It is of course easier to export the bark but it would be much more economical to adopt in one or two distilleries a slightly modified process of distillation and export the much more valuable essential oil. The cinnamon which were wild trees were not treated with the same care and trouble which would have been the case, had they been cultivated plants. They have almost everywhere disappeared except on Crown Lands and on a few private estates. The exportation of cinnamon bark is for this reason declining.

Another method of making use of cinnamon trees, which have escaped destruction or which were considered too small for being barked, has been adopted this year in a much more sensible and economic way. The leaves and twigs are lopped with the least possible injury to the trees and another crop of mature leaves obtained 18 months after. This method allows an indefinite yield of about 20 litres of cinnamon leaf oil per acre per annum worth Rs 100, and this figure is high enough to warrant the process being adopted by the planters of the Colony on a larger scale. The cost of purchasing the leaves and of distilling amounts to about Rs 2 per litre of oil leaving a nett profit of Rs 60, per acre.

The small twigs which are distilled together with the leaves give up a certain percentage of bark oil (10 o/o) which readily mixes with the leaf oil but a certain amount of care is needed in order not to loose this bark oil which is lighter than water while leaf oil is heavier. Over 3054 litres of cinnamon leaf oil out of a total quantity of 4142 litres worth Rs 17,480 of various oils were exported during the year. The other essential oils distilled in the Colony are obtained from—

1o. Lemon grass (Cymbopogon citratus)
2o. Clove (Caryophyllus aromaticus)
3o. Vetiver (Cymbopogon muricatus)

while the following plants are being actively propagated for ultimate distillation:

1o. Cochin lemon grass (Andropogon flexuosus)
2o. Ceylon citronella (Andropogon nardus)
3o. Ylang-Ylang (Cananga odorata)
4o. Basil (Ocymum basilicum)

A consignment of other lemon grasses was obtained from Ceylon this year but unfortunately the best varieties, viz: Andropogon Martinii (Palmarosa oil grass) and Java citronella which yield much more valuable oil did not stand the voyage. Another consignment is expected.

Cochin lemon grass produces also a valuable oil and it grows very luxuriantly in this Colony reaching 8 feet high under favourable conditions flower stalks expanded. The quantity of leaves per acre of Cochin grass is much larger than the yield of Ceylon lemon grasses which never flower in Seychelles.

With regard to Ylang-ylang, a sample was prepared at the Botanic Station from trees scattered about from various localities. The sample was submitted to the Director Imperial Institute who found that its constants agreed with those recorded by Bacon for first grade Manilla ylang-ylang oil. Although the tree producing ylang-ylang (Cananga odoranta) flowers very nearly in this Colony and reaches colossal dimensions in

sheltered valleys near the sea, an attempt to grow it on hill sides has failed entirely, the wind being very injurious in preventing the treee from flowering and the rate of the growth being unsufficient. It is however possible to grow it alongside the so called marshes of Praslin and there is no reason why a small industry should not be started, the class of oil obtained being of high grade and easily saleable in spite of overproduction.

There is still a small quantity of citrate of lime made at Silhouette Island mostly from bigarades (citrus limonellus) but, in presence of the epidemic of scale insects mostly lecanium viride and Aspidiotus ficus which attack all citrus plants growing in Seychelles there is very little hope of developing this industry except in localities where the insects in question have not yet reached the epidemic stage.

I am greatly in favour of growing Bermuda onions in the Outlying Islands such as Astove, where very fine sand has been deposited on the lagoon side of the atoll. This sand is mixed with phosphatic guano and is so very fine that it lends itself to the requirements of onion culture besides the climate which is extremely dry from April to November and which should materially assist in the proper drying of such perishable bulbs.

The total quantity of onions imported in the Colony amounts to kgs. 60,908 and the article is retailed in shops at the price of 12 to 20 cents the lb.

The cacao industry is vanishing in Seychelles, the quantity exported for 1913 amounting to 15 cwts only. There are many localities where however such a very profitable industry should still be carried out. The local variety (Caracas) is attacked by the black rot (Phytophthora omnivora) but no measures of treatment have ever been tried. More resistant varieties such as Venezuella criollo and Ceylon Forastero have become established and there is no reason why they should not be cultivated in all localities sheltered from the wind and provided with a good type of soil.

VIII.

The Rubber Industry.

Rs 4,165 worth of rubber was exported in 1913 as compared with Rs 2,265 the year before. The total acreage under rubber amounts to about 1,100 acres and all estates have now stopped tapping in presence of the fall in price of the article. According to figures published in the India Rubber Journal it is difficult to forecast the prospects of the industry but various things go to show that the price per lb will remain at about 3 shillings and at this price the margin of profit in Seychelles is extremely low, the trees being of slow growth though remarkably free from disease. The fall in price has been caused by various factors among which three should be mentioned:

1o. The American strike.
2o. The sale of synthetic rubber at about 3s per lb.
3o. Overproduction.

So many factors being involved it is difficult to imagine that the former prices of 6 to 12 shillings will ever be realized again.

On a small estate in the neighbourhood of the Station, the cost of tapping and curing amounted to R. 1.10 a lb.

Planters are now growing vanilla under rubber trees (which form excellent shade trees for this orchid) and waiting for better times. So many uses are found for rubber every day and the consumption is so much keeping pace with the production that rubber is certainly one of the products which cannot be completely neglected. Now a days all articles are liable to suffer from substitutes and overproduction but never before have plantations of one kind of tree been made on such an extensive and rapid scale as is the case of rubber (1,500,000 acres in 7 years). This will probably serve as a lesson for the future.

The climate and soil of this Colony is so suitable for the healthy growth of Para rubber trees that I do not think that the trees already planted should be destroyed. When they will become larger trees they will be fit to produce much cheaper rubber as the yield per tree will have considerably increased, and the colonies where the soil and climate are not so suitable will have gradually abandoned the field of competition.

IX.

Crown Lands.

The lease of Crown Land Savoie has been transferred during the year from Mr Potbin to Mr Arthur Savy, the rent (Rs. 250) remaining the same.

Crown Lands Planeau and Bardau which occupy the summits between Misère, Barbarons and Cascade have been leased to Mr D'Emmerez de Charmoy for 30 years with the right of barking cinnamon, for Rs. 75 per annum.

Crown Land Newcome at Praslin has been divided into 6 plots of 12 acres each and one of them leased for Rs. 20 per annum to Mr F. Marie. The other plots consist of poor denuded land and they will be leased with difficulty.

The central plateau of Mahé acquired by portions in 1909 and 1910 is still being gradually reafforested but the work is slow owing to the small number of labourers (4 men and 1 boy) employed and to the necessity of keeping open some of the boundary lines and footpaths.

The following plants have been set out during the year:

Cedar (Casuarina equisetifolia)	2137
Calice du Pape (Tecoma leucoxylon)	1373
Parkia Roxburghii	675
Bois de table (Heritiera littoralis)	3124
Indian beech (Pongamia glabra)	378
Cocoplum (Chrysobolanus icaco)	1178
Takamaka (Calophyllum inophyllum)	386
Gliricidia maculata	75
Cola nitida rubra	60
Coffea robusta	75
Sandoricum indicum	30
Improved mangoes from Mauritius	33

Over 133 mango trees were also distributed to the J.Ps. of South Mahé and Praslin for planting along road sides. A great quantity of seed of palm oil and Gum Copal (Trachylobium verrucosum) have also been sown in the nurseries at Niol. This latter tree once existed in large numbers all over Mahé; there are hardly half a dozen remaining at present. They were cut down for timber.

A large consignments of seeds was received from Nossi-Bé (Madagascar) in order to propagate again this useful plant which grows into very large and handsome forest trees in the North West of Madagascar. In Seychelles the specimen left are small trees. Not only is the timber excellent but the gum obtained from old trees is worth from 1s. to 2/6 a pound. The fumes from burning pods are also used in Madagascar as a repellent against mosquitoes.

X

Insect Notes.

The green scale (Lecanium viride) still continues its depredations in the low country on coffee, citrus, and ixora bushes in spite of the fungus parasite (Cephalosporium lecanii) which has found a more congenial home and keeps in check more easily the scale insect above 1000 feet elevation. This fungus parasite has also been found this year attacking lecanium tessellatum on cinnamon.

Another scale insect of world wide distribution (Aspidiotus ficus) which the oldest inhabitants have known from childhood has extended its depredations during the last three years in various islands of the archipelago, some at 150 miles distance from Mahé, thus showing the effect if some unknown factor (probably climatic) on the spasmodic propagation of this species. Coconut trees were virulently attacked, the trees attacked being scattered about in a given plantation and not necessarily in the same grove, but it is a great mistake to think that these palms are the only food plants of this insect locally called barnacle scale.

Other trees and also shrubs which are used as props for growing vanilla between lines of cococut trees : Frangipane (Plumeria acuminata), Breadfruit (Artocarpus incisa), pseudo sago palm (Cycas officinalis) Citrus and Roses are also food plants of this insect. I always found it on one of these plants in a more or less dormant state on all the estates which I visited. Frangipane is one of the worst plants to grow between lines of coconut trees as it is also attacked by another very dangerous scale insect (Lecanium hesperidum). The presence here and there of trees such as Takamaka (Calophyllum Inophyllum) between lines of coconut palms has also been found to propagate another allied scale (Lecanium tessellatum) which also attacks coconut palms besides being always present on Cinnamon plants which are also used as props for vanilla in or near coconut plantations. It is therefore important when destroying the barnacle scale (Aspidiotus ficus) on coconut trees not to keep a host of food plants in the neighbourhood, the evil on coconut palms being done not only by this small scale but also by Lecanium tessellatum. Aspidiotus ficus spreads suddenly after remaining dormant for years but it also stops its depradations quite as suddenly as noticed in several parts of Mahé, where it was complained of as a pest in one year and taken no notice of the next year. It seems however important that this insect should be combated when it is in its dormant state especially on those bushes such as Cycads and roses which are more easily accessible than tall coconut trees. The insect is fatal to young coconut trees suffering from drought or from unsuitable soil conditions and its presence is clearly noticeable at a distance on these plants by the spotted appearance of the leaves. It propagates as much in wet years as in dry years. The lemon coloured youngs are very conspicuous with a lens actively moving about on the leaves preparatory to remaining attached, a few hours after, for the rest of their lives. In destroying attacked coconut leaves one should also be careful to burn or scorch the younger leaves which conceal quite as many insects just visible as dots to the naked eye. There are very few parasites of this insect which have been found as yet, only an infinitesimal proportion showing holes in their skins punctured by some hymenopterous fly. Before ending this chapter on scale insects, it may be interesting to record that Lecanium hesperidum and Lecanium tessellatum have been found to infest leaves of water hyacinth (Eichornia crassipes). In countries where this water plant is a pest these scale bugs may be considered beneficial.

The scale insects are always accompanied in their depredations by ants which seem to play an important part in their distribution. For this reason it was considered urgent to study the life history of the commonest of these ants (Technomyrmex albipes) which has also become household pest by itself.

These black ants are supposed by the public to have been introduced in 1904 from Ceylon in a consignment of coconut, cacao, nutmeg and Hevea rubber seedlings which arrived by H. M. S. "Merlin".

In another report this question of the introduction of the black ants is fully discussed and from different documents in my possession it is abundantly proved that they are indigenous. They were described in 1861 by Smith and found later at Kew in a consignment of plants received from various Colonies. Professor Stanley Gardiner, F. R. S., found them at Farquhar Island in 1905 and Mr Hugh Scott the Entomologist from Cambridge who accompanied Professor Gardiner in the latter's second scientific expedition to Seychelles in 1908 collected specimens of the ants in question (the type and the sub-species) on the summits of Mahé and Silhouette Islands. (Transactions of the Linnean Society of London Zol. Vol. XII & Vol XV). Professor Forel the great authority on ants also described them as far back as 1892 as occurring in Madagascar and neighbourhood.

It is however true that these ants did not become household pests nearly everywhere in Victoria until after 1906 and this fact can only be accounted for by the development of scale insects, which, after the droughts of 1904, 1905, obtained a stronghold and caused the destruction of most of the citrus, hibiscus and Liberian coffee plants growing in the Colony. The favourite food of ants being the excretion of scale insects which in their turn are protected from their parasites by the ants, it is natural to think that the development of scale insects was accompanied by an invasion of ants. One can say that in Mahé the spread of the ant which in some cases was found to cover about a mile in one year is entirely due to the invasion of scale insects which attacked one tree after another from 1904 onwards ; various species of scale insects attacking various groups of plants from one estate to another, the ants easily detecting and following the track of the scale insects.

The rapidity with which these ants form a colony is astounding. They nest almost everywhere in laboratory test tubes, burettes, pipettes &c., in drawers, in rolls of paper, in bamboo pots (a favourite spot) in piles of wood, in compost heaps, in straw packing materials of all sorts, in rough bark, in crevices and holes and even between leaves of a great variety of plants where the nest is sheltered by accumulated dust and debris. Straw of all sort is also a favourite spot ; even the dead leaves of lemon grasses, scittaminae &c., growing in clumps, are locations very often selected.

No place is however more often selected than the sheathing leaves of the coconut, banana and sugar cane. Even on these places they suffer much from heavy showers of rain which cause a great number of them to be drowned. The dead bodies are picked up the next morning and heaped together along side roads by the workers, a habit which cause many persons to think erroneously that these ants often die in thousands through contagious diseases.

These ants are kept under control by natural agencies such as heavy showers. I have often observed them on banana plants during a heavy storm and seen how cunningly they avoid the water which runs down the stem and enters their nest, but their efforts are in vain when the heavy shower lasts more than one hour. The greatest damage done by ants being the increase which they cause in the propagation of scale insects by sheltering and protecting the latter from their natural enemies, one can understand that the destruction of scale insects by spraying materially assists in the destruction of ants by limiting their distribution ; but as the workers in search of food form only a small percentage of the insects of the same form living in the nest, one can see at once that by destroying workers only, no important results are achieved. The eggs are laid by the queens only, and therefore the number of workers produced is instantly being increased and surely in much greater proportion than the number of foraging workers that can be destroyed by repellents, such as Arsenite of Soda in weak solution and tapes soaked in corrosive sublimate.

If one considers that no single estate is free from scale infested plants, one can imagine the rapidity with which the ants spread, in spite of their so-called social habits which in most cases cause them to spread slowly under normal conditions.

With the exception of North Island, Marianne, Aride Island in the Mahé group ; Aldabra, Astove, Cosmoledo in the Aldabra group, and the Amirantes, all the other Islands

are infested and if no measures are taken to stop the propagation of ants carried in supplies purchased from shops it will not be long before the insect has invaded the whole archipelago as there is no climatic factor which can hinder its normal spread. It is however fortunate that so far none of them have spread and become a nuisance above 1,500 feet elevation and it is proposed to ascertain if their non-occurrence above this altitude is a question of climate or whether parasites there exist which effect their destruction.

The ants are principally troublesome owing to their protecting countless numbers of scale insects. The following are the scale insects with which they live in association :

1. Icerya Seychellarum
2. Lecanium tessellatum
3. „ longulum
4. „ frontale
5. „ viride
6. Dactylopius citri
7. „ virgatus
8. Asterolecanium epidendri
9. Pulvinaria psidii
10. „ Antigonii
11. Vinsonia stellifera
12. Aspidiotus ficus

They seem not to care in the same degree for:

1. Chionaspis inday
2. Hemichionaspis minor
3. „ aspidistrae
4. Diaspis pentagona
5. Mytilaspis auriculata
6. Lecanium nigrum
7. Asterolecanium bambusae

which are quite as common insects as those on the preceding list but they are strongly established on certain species of plants before the ants take any notice of them.

The scale insects are protected from storms and ennemies by a sort of shelter built by the ants which make use for this purpose of soil or some light vegetable debris within their reach. One can understand how scale insects so eagerly protected can multiply in their attack upon plants. I have not been able to find ants actually transporting eggs or young of scale insects ; the latter, provided with legs, are, it is true, so easily propagated from one plant to another by natural locomotion and by the wind that no assistance on the part of the ants in this connection seems necessary. But the fact has, it appears, been recorded elsewhere.

The ants have so far not been found to injure seeds, flowers, fruits, honey bees, eggs or chicken but they crawl upon all sorts of food on the table and this is enough to make them a great pest. There are other forms of injury for which they may in time be found responsible such as for example the destruction of other species of useful ants and the dissemination of germs of contagious diseases.

The worker is the smaller adult form (measuring 2 millimetres) and its colour is jet black with the exception of the club-shaped antennae which possess a whitish tinge under a magnifying lens and of the joints of the legs and of the mandibles which are yellowish. The antennae are composed of two joints which meet nearly at right angles and are of considerable length. The males are a little broader and longer (3m/m) than the workers and besides being provided with two pairs of wings they are easily distinguished from the queens, 1o. by their large and deep thorax which equals the length of the abdomen, 2o. by the antennae which seem nearly always erect and not always forming an angle as is the case with the workers and queens. The antennae of the males are also shorter and not so club shaped as in other adults, 3o. by the shape of their abdomen which is distinctly shorter and slightly curved at the apex.

The queens are a little longer than the males and they can be distinguished from the latter before losing their wings by the length of ther abdomen and their reduced thorax. The thorax is intermediate in dimensions between that of the workers and that of the male. In general appearance the queen is much like an enlarged worker, the antennae being the same although the size of the thorax and abdomen is a useful distinguishing feature. It is perhaps for this reason that I have as yet never been able to find a wingless fertilized queen.

In December, January, and February it is quite common to see the males and females flying about in the neighbourhood of their nests. They do not go very far during their nuptial flights but the queens on alighting afterwards are sure to find foraging workers for the tending of their eggs and young. The male is in fact a very common insect at that time of the year during which our observations were made. One has only to examine a masonry wall of a certain height to see them at any moment in the morning and in buildings provided with such walls where a crowd congregates, as for instance in churches one can see them crawling on the white clothes of the worshippers and flying aimlessly or darting about. The virgin queens are not so commonly seen flying about but on examining nests the number of males and females seems to be very great, showing how richly these insects are provided by nature to propagate and multiply. I was a long time before I was able to find the winged insects and the fertilized queens as they are never to be found in the foraging trail of the workers. The best chance of seeing them is to disturb a nest in a sugar cane field where under almost every dry sheathing leaf still attached to the stem a colony is to be found. These sugar cane leaves on being rapidly detached can be shaken into the mouth of a killing bottle and a large collection of ants in all stages of growth and metamorphosis can thus be obtained in a short time. The same colony can of course be procured inside the sheathing leaves of bananas, coconuts and other palms &c., which form quite as good a breeding place but there is a great difficulty in handling such large leaves on the top of a killing bottle without most of the winged insects and workers escaping.

Sublimate solutions may be found useful in houses but they are of no use whatever in the field, simply because they serve to drive away the foraging ants and not to destroy the egg laying insects. The nests have to be destroyed by spraying with soda resin solution whenever found in the abovementioned locations and in trap boxes containing straw laid open the contents of which are periodically burnt with all forms of the insect. While destroying the natural or artificial nest in places, it is important that the ants should not be allowed to crawl up trees where they could take refuge and form new nests. And with this end in view tanglefoot such as adhesite (R. 1 per kilo) used on paper bands is very good.

The question of establishing trap boxes for insect destruction has also been found very useful in the campaign against the Rhinoceros beetle in Samoa. Trapping is done by means of especially prepared heaps of decaying vegetable refuse. The beetle lays its eggs in the trap and the larvæ are subsequently collected and destroyed or inoculated with a contagious disease. The traps are four feet square and are composed of logs of coconut stem or of a stone wall 14 inches high ; they are excavated about four inches in the ground. The interior of this enclosure is filled with decaying pieces of coconut stems, dung dead wood, plaintain stems, sugar cane, megass kept damp and covered thinly with soil. In Seychelles where the rhinoceros beetle sets back considerably the growth of the young coconut trees, these traps should prove useful. All palm besides the coconut are attacked except, Areca nut, Cyrtostachys, Hyophorbe, Caryota urens, chrysalydocarpus and various species of Arenga. The coco-de-mer is fortunately seldom attacked. Livistonas, verschaffelta, oreodoxa and Deckenia are the favourite food plants.

It may not be out of the place here to mention that Anatto seeds (Bixa orellana) when half ripe are used in houses as a repellent against bed bugs besides giving a fine red appearance to the floors.

XI

Coconut Beetle (Melitomma insulare)

A large collection of insects of this species in all stages of growth were supplied last year to the Director of the College of Tropical Agriculture, (France) who kindly supplied in exchange a photographic negative from which one hundred prints have been made and distributed to planters.

This insect is better kept under control than formerly by the destruction of the fallen trees and by removing the larvæ from trees still standing. This entails a considerable amount of labour as the larvæ bore into the heart of the tree and the inside tissues have to be removed and the large wounds tarred over.

It seems difficult to trap them as they breed inside the trees and the females do not seem to go a long distance with their enlarged abdomen which prevent them from flying. The much smaller males fly a longer distance. It is however necessary that openings should exist in the stem of the trees near the roots to allow the powerless females to introduce their ovopositor which is nearly as long as their body. In well kept plantations the beetle find a less congenial home but I was surprised this year to reckon as many as 11 o/o of young trees (10 years nearly) badly attacked in many plantations.

With regard to the destruction of mosquitoes, I have to record the introduction from Mauritius of the Million fish (Girardinus poeciloides). Five young specimens werehanded over to me by Mr Lanier and a few months after hundreds of specimens had been obtained. In a small basin 5 adult goujons (Hapochilus playfairi) and 10 Million fish were placed, and two months after the 5 goujons were still to be found but the number of Million had increased to three hundred. This experiment tends to show that the propagation of the latter is much easier and it is proposed to enlarge them in the rivers if newly conducted experiments show that the eggs of the goujons and fresh water crustaceans are not destroyed by them.

XII.

Fisheries.

The export from Outlying Islands for the year under review amounted to:

Produce.		Quantity.	Declared value.
Salt Fish	pkges	241	Rs 12,822
Tortoise shell	kilogs	1,724	62,799
Calipee	,,	5,786	16,501
Trepang	,,	2,109	1,106
Shark fins	,,	1,133	652
Turtle bones	,,	30,000	1,350
Quitouze (salted turtle)	,,	538	442
Fish oil	(hectolitres)	4½	100
Whale oil	do.	209½	4,542
Guano	tons	34,720	997,400

Whale fishing on a large scale is under consideration by a new Company and it is also proposed to make fish guano out of the carcases and other residues.

Another Company is also being set on foot for fishing with modern appliances for the preparation of salt fish for export under the management of an experienced Seychellois gentleman weli acquainted with tbe numerous shoals of the archipelago. This latter Company contemplates curing high grade fish for the markets of India, Ceylon and South Africa and destroying sharks on a great scale. From the vast number and varieties of whales and sharks which inhabit this part of the world, one can forsee that their destruction will coincide with an increase in the numbers of fish coming inshore to the benefit of the local fishermen who supply the market with fresh fish.

The question of caret (Hawksbill turtle) raising has received a blow from which it may not recover. A disease broke out suddenly in the parks of the Mahé Syndicate at Alphonse and St François and all the young carets numbering over 3000 were found dead in the parks at the same date separated from each other by a deep sea channel and the distance of over 6 miles. No investigation was made on the nature of the disease which the overseers on the spot state had gradually increased in virulence. In the park of Curieuse very little progress has been made and the matter is there still in the experimental stage. The carets at Alphonse were fed exclusively on fish, jelly fish and shell fish but from the contents of the stomachs of several carets which I have examined it seems that a very high percentage of the food consists of sea weeds. In one case as much as 98 o/o of the food was found to consist of common sargasso weed and in several others a species of Cymodocea (Cymodocea sp.) was the predominant element found in the stomachs of these animals. It is obvious that the question of carets raising should be put on a scientific basis and entrusted to persons having much time and knowledge to devote to such an important matter. Hitherto it has occupied the attention of two firms engaged in many other industries which scarcely allow them enough time to engage in systematic experiments. I think these experiments are worth starting as at Alphonse no real difficulty was experienced before the carets were six years old and such a long time of successful raising goes far to show that the successful issue of the industry is far from being problematic. Those new Companies interested in whale fishing and fish curing by the nature of their enterprises may perhaps find better opportunity for carrying on the new industry.

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